THE MOTOR AGE

THE AUTOMOBILE AUTHORITY OF AMERICA

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LEADING CONTENTS

ABOUT THE SELDEN PATENT

That a matter of greater importance than any which has yet appeared, to a very large part of the motor-vehicle industry, should have been given publicity by The Motor Age, alone, of the several journals devoted to the trade, speaks volumes for its enterprise.

That this exclusive information should have been handled in such thorough fashion indicates that the value of the news was fully appreciated.

As is often the case, where attention is suddenly called to an important patent, the patent office supply was exhausted—possibly by design—and, had it not been for the publication of the complete Selden specification in The Motor Age, there would have been no means by which interested firms could have obtained an idea of what the patent was. Copies of the paper containing this specification can be had at either the New York or Chicago office. It will be interesting to see what excuses the other publications make for being completely "scooped" in a matter as important as this.

There is not a great deal in the way of

further developments in the matter. A letter from the patentee, George B. Seldon, shows, by the letter head on which it is written, that he is a patent attorney, a fact which doubtless accounts for the long period between the filing of the application and the granting of the patent. Its granting was doubtless purposely delayed.

Mr. Selden's letter reads as follows:

Editor The Motor Age:—

Your patent expert apparently overlooked the endorsement of my patent by the Commissioner of Patents in his Annual Report for 1896, in which he said: "Selden, in 1895, received a patent November 5, No. 549,160, which may be considered the pioneer invention in the application of the compression gas engine to road or horseless carriage use." (Official Gazette, May 12, 1896, page 1017.)

Yours respectfully,

GEO. B. SELDEN.

Expressions from a number of manufacturers of gasolene motors and vehicles show that there is a general disposition to form a protective association, on the lines indicated by The Motor Age last week. The following will serve as a sample of the general feeling:

Editor The Motor Age:—

We wish to congratulate you on your expressions in The Motor Age, issue of June 14, on the Selden patent No. 549,160. We feel as you do in this matter and earnestly trust that you will take up this matter as you did the Bicycle Trades Protective Association. We assure you that you will have our hearty co-operation, as we feel that the action of the Columbia & Electric Vehicle Co. is an imposition of the first water.

Faithfully yours,

THE QUICK MFG. CO.,
E. M. Rodrock, Treas.

The following letter from Rudolph M. Hunter, a Philadelphia expert and counsellor in patent causes, and himself the originator of a large number of valuable patents—among the users of which are the General Electric Co. and its subsidiary companies, the American Bell Telephone Co., the Westinghouse Electric & Mfg. Co., the Aeolean Organ & Music Co., the General Electric & Automobile Co. and the Tractor Truck Automobile Co.—is of particular value at the present time, analyzing, as it does, the Selden patent claims, showing the possibilities of a successful defense and the dangers of failure to take prompt and concerted action:

Editor The Motor Age:—

Your publishing of the Selden patent No. 549,160 complete, together with the criticisms relative to it, is timely, for while this matter has been brewing some time, it was hardly credited, and but few knew of the intention of the Columbia & Electric Vehicle Co. to attempt to control the field of gasolene automobiles under the Selden patent. Your suggestion that the defense of any suit under this patent should be carried on in the joint interests of those who would be affected by an adverse decision is sound common sense and the only safe manner of dealing with the question, because the time to nip such a colossal and far fetched attempt is at its incipiency and before any unwarranted decision of the courts, based upon a meagre showing of the ample defense available, is secured. As one who has followed the automobile art closely and been identified intimately in the patent situation upon the same for a great many years past, I am prepared to assert that the aspirations of the Columbia & Electric Vehicle Co. to the monopoly of the gasolene vehicle by virtue of the Selden patent are absurd and wholly untenable. My long experience in patent litigation, and especially my attention to motor vehicles, leads me to say that the Selden patent upon its face is a greatly more limited patent than it appears to be. There is not a single claim in the patent which could be sustained for a legal construction which would act to give the owners of the patent a monopoly. If the claims are constructed in any manner generically sufficient to control the industry, they will be anticipated by many patents not hinted at in its specification or file wrapper. That Selden was not the first to propose the use of a gasolene engine as the motor for a wagon is acknowledged in the patent itself, and the idea that there is some inherent novelty in the combination of such a specific motor with the rest of the elements is too preposterous to merit serious consideration. It is a fact that automobiles have been described prior to the date (1879) of the filing of the Selden patent, showing the reciprocating motor and "having a rotating shaft connected with and arranged to run faster than the propelling wheels, and intermediate clutch or disconnecting device" for connecting or disconnecting the engine shaft with the driven wheel. They show further the running gear in which the steering is performed by a rack and gear control of the fifth wheel structure in which the wheels are journaled. The arrangement

of the engine, the vessel to contain the fluid for generating its motive force, the rapidly driven engine shaft, the slower driven wheels and axle, the speed reducing gearing between the motor shaft and axle, and the clutch or disconnecting device to connect or disconnect the engine shaft with the axle to allow it to rotate without propelling, combined with and placed on the truck and the truck swiveled on the vehicle body by a large fifth wheel which is provided with rack and gear steering means controllable by hand, is old in the prior art. This being so, where does the Selden invention come in, either generically or specifically? The incorporation of the liquid fuel receptacle into the claims will not add to its validity or strength, but is most damaging to the preposterous contentions of the owners of the patent, as it is positive evidence of the restricted character of the claims. The same is true of the only mode of reversing the vehicle shown, which requires the motor, wheels and axle to be bodily turned around. These facts will cast a little light upon the language found in the first part of claim 1, the claim particularly relied upon for the monopoly, to-wit: "Provided with suitable running gear including a propelling wheel and steering mechanism." Analyzed, it simply means a running gear connected to the body by the fifth wheel so that it can be revolved about its king-bolt and having one (or two, if you wish) propelling wheel, the engine and gasolene tank moving with the axle and fifth wheel. That is as broad as any reasonable construction can be put upon it, and I do not admit that it is even clothed with any novelty when so limited for the reasons stated above as to the prior art. There are numerous patents anterior to the available date of Selden which would so narrow and restrict the possible scope of his patent to save it from invalidity that it would be difficult to find its applicability to the general types of gasolene vehicles which are in use. There are a number of defenses to the Selden patent. As some of your readers may think I am perhaps too sanguine, I would only ask them to bear in mind that as my own patents relating to motor vehicles are upward of two hundred, I have during the last twenty years had much occasion to give this matter some serious thought. I am not mistaken in my views thus briefly expressed above.

As the attorneys of the Columbia & Electric Vehicle Co. are the attorneys of the General Electric Co. and stand with the best legal talent in the country, too much caution cannot be exercised to guard against allowing them to secure for their clients an unreasonable decision for want of proper defense.

Frequently the course pursued is to bring suit against a manufacturer who cannot or who is not interested sufficiently to make a strong defense. The court, "educated" (?) by the specious and ingenious arguments of counsel for the complainant, is unintentionally led into giving a decision wholly inconsistent with the real facts as to the art, which places in the hands of the complainant a strong weapon to thereafter use in applying for preliminary injunctions against the stronger manufacturers with a view of throttling all competition. If the manufacturers of gasolene vehicles are wise they will array themselves as a unit against any such attempt upon their rights.

For the satisfaction of your readers I may say that preparations are now being made with a view of bringing several suits against the Columbia & Electric Vehicle Co. and its licensees for wholesale infringement, and any attempt on their part to monopolize the automobile art may be a "boomerang" which they may not easily forget.

R. M. HUNTER, M. E., E. E.

Philadelphia, June 18.

—

FROM NEW YORK

New York, June 18.—No further particulars of the proposed infringement suit to be brought at once by the Columbia & Electric Vehicle Co. against all makers of gasolene vehicles on the Selden patent have been secured since the first exclusive announcement of the fact in Motor Age last week.

Frederick Betts, of counsel for the Columbia people, was out of town Saturday and too busy to see your correspondent today, and no one in his office could or would give any information as to whether the papers had yet been served or just who the defendants would be.

William A. Redding, another of the counsel, who told the Motor Age representative that the suit would be begun before he left for Europe on July 27, was out of town, not to return until the end of the week.

Motor Age's exclusive story of the coming big foundation patent suit created a sensation in automobile circles, and among gasolene vehicle makers there was a unanimous opinion that the safest and surest way for defense was the formation of an association of gasolene vehicle makers on the lines of the Cycle Trades

Protective Association in its fight against the cycle trust in the bottom bracket litigation, as suggested by Motor Age.

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IS THIS PART OF THE MOVE?

New York, June 18.—The stockholders of the Columbia Electric Vehicle Co., meeting at Trenton, N. J., on June 20 to ratify the proposition to increase the capital stock of $12,000,000 to $18,000,000 and purchase the other half of the stock of the Columbia Electric Vehicle Co., which is practically the property of Col. Albert A. Pope. The General Carriage Co. does not figure at all in the proposed purchase, as has been reported.

"No, this is not a trust yet," said Secretary Tepee to The Motor Age representative. "We may make a trust of it some day, but not just yet."

THE GORDON-BENNETT CUP RACE

It is over.

Charron won the race.

France retains the challenge cup.

The one American competitor made a plucky and creditable showing.

As was generally expected, the Gordon-Bennett challenge cup, the massive silver trophy offered by the enthusiastic American chauffeur and proprietor of the New York Herald, with its Paris edition, was won by a Frenchman and will be held by the Automobile Club of France until a challenge is issued by the representaive club of some other country, the cup again raced for and won by the representative of some other country.

Considerable uncertainty as to the date that the race was to be run was caused by the "war on automobiles" that was recently inaugurated by the French officials, as it was a question whether or not a permit could be obtained for the holding of the race over the Paris-Lyons course, a distance of 351 miles. The permit was finally obtained, however, and warning was given, all along the course of the race, for citizens to use proper precaution in avoiding the racers. Big posters adorned the walls in all thickly settled localities, giving such warning, and the gendarmes were out in force all along the route.

Entries had been received from France, America, Belgium and Germany, and each country had a representative to look after the interests of the club representing his country. Germany was represented by Count Sierstorpff, France by Comte Chasseloup-Loubat, America by Mr. Dinsmore, and Belgium by Mons. Ruys Orban. Considerable friction was aroused by the German and Belgian representatives, who claimed that the time of preparation for the race had not been sufficient and demanded a delay of a week or so. The French and American representatives objected to this and the postponement was not, accordingly, allowed.

Those who finally started in the race were Charron, Rene de Knyff and Girardot, representing France; Jenatzy, representing Belgium, and Alexander Winton, representing America, the German, competitor withdrawing at the last moment.

The victory was obtained by Charron, the winner of the Paris-Amsterdam race two years ago and the Paris-Bordeaux race in 1899. The following details are from the New York Herald:

Le Velo points out that this race proves that an automobile can beat the Paris-Lyons express, for though the time of the express is less than that taken by Charron to-day, the distance covered by the train is much shorter. The itinerary followed in the race is longer than the direct road, it having been necessary to lengthen the route in order to make it above 550 kilometers (341.5 miles), as required by the conditions of the race.

The Paris-Lyons express takes nine hours, all but seven minutes, and the

distance is 512 meters (318 miles) between the two stations.

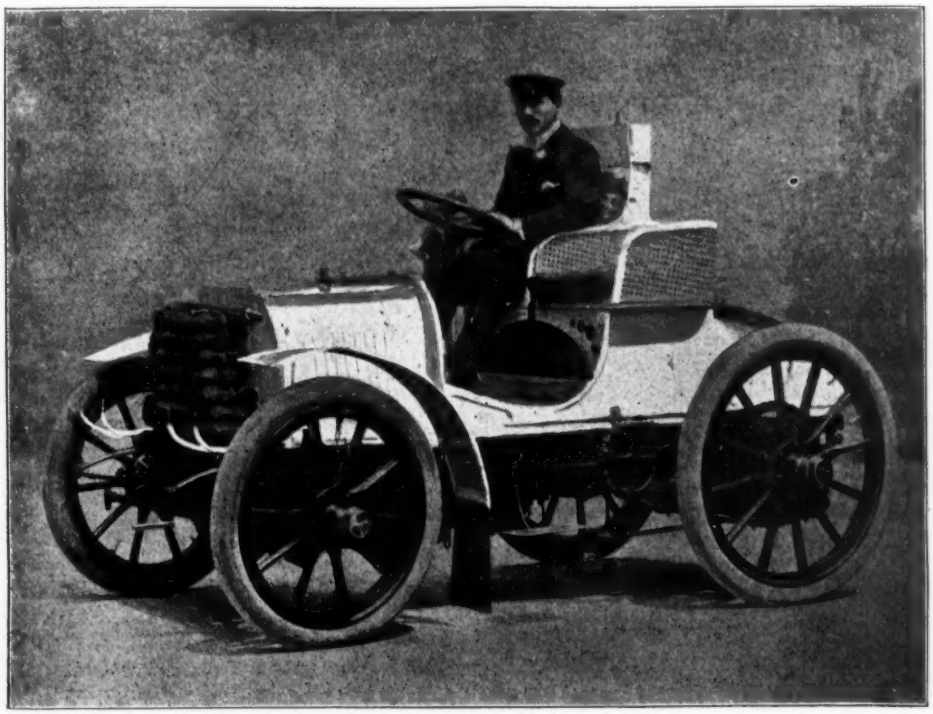
Charron took nine hours and nine minutes to do 566 kilometers (351 miles), but at the rate of 61 kilometers 857 meters, Charron's average speed, the train would do the 512 miles in eight hours and sixteen minutes.

Seldom has a race been marked by so many surprises, both at the start and during its progress.

Despite the early hour quite two hundred people were present, many of whom had come on automobiles and bicycles a long distance.

The scene was very picturesque in the semi-obscurity. Men were carrying lanterns and giving the finishing touches to the racers, while the spectators scrutinized the rival machines.

Jenatzy did not enter with the machine that had been made specially for the cup



CHARRON IN HIS RACING CAR.

Contrary to expectation, the Belgian contingent was represented in the person of M. Jenatzy, whereas the German competitor at the last moment decided to withdraw.

During the race itself Rene de Knyff became stranded, Girardot met with an accident, and Winton had a breakdown.

The signal to start was given at a quarter past three o'clock in the morning, on the Versailles road, at the entrance of the Parc de Saint Cloud, just above the Montretout level crossing.

race, as it was not ready, and some complaint was made against the tires of his improved racer because they proved to be of French make.

Engen, the German competitor, declared that he would not start, because the tires of his machine were not ready.

At the same time he protested against the short time allowed to prepare for the race.

This protest was indorsed by Jenatzy.

Comte de Chasseloup-Laubat, who appeared to be the only representative of

the organizing committee, acted as starter.

M. Edouard de Perrodil's chronometer marked 3:14 a. m. when the signal was given.

Instantly there was a terrific snorting and the racers started at their best speed, going up the sharp incline which follows the tunnel at a rate of sixty kilometers (37¼ miles) an hour.

Rene de Knyff and Girardot led, followed by Charron, Jenatzy and Winton.

In a few seconds they were out of sight.

Le Velo publishes the telegrams which its correspondent posted along the route.

At the Picardie gate, entering Versailles, the times were:

Girardot, 3 hours, 23 minutes.

Jenatzy, 3 hours, 23 minutes, 2 seconds.

Charron, 3 hours, 24 minutes.

Winton, 3 hours, 24 minutes, 1 second.

Rene de Knyff, 3 hours, 24 minutes 2 seconds.

At the Buc gate, leaving Versailles, the times were:

Girardot, 3:26:00.

Jenatzy, 3:26:02.

Charron, 3:26:30.

Rene de Knyff, 3:27:00.

Winton, 3:27:04.

At Limours, a distance of thirty kilometers (18.6 miles), the times were:

Girardot, 3:49:15.

Charron, 3:52:00.

Rene de Knyff, 3:53:30.

Winton, 3:59:00.

Jenatzy, 4:29:00.

Levegh, the unofficial competitor, who had started in front of the regular contingent, was noted passing Lemours at a rate of 100 kilometers (62 miles) an hour.

Comte Chasseloup-Laubat passed four hours and fifteen minutes after the start, taking a short cut to rejoin the racers.

At Chateudon, 125 kilometers (95.6 miles), the following times were noted:

Levegh, 4:32:00.

Charron, 5:40:55.

Girardot, 5:41:44.

Jenatzy, 5:51:56.

Winton, 6:28:50.

Mr. Winton went by with a bent wheel in front and one of his rear tires punctured.

At Les Ormes, 154 kilometers (95.6 miles), the times taken were:

Girardot, 5:49:00.

Charron, 5:55:00.

Rene de Knyff, 6:41:00.

Jenatzy, 6:46:00.

From Orleans the correspondent of Le Velo telegraphed that the utmost uncertainty prevailed as to the course which the competitors would take in passing through the city, and it was only by a lucky accident that he was able to catch sight of them.

Girardot arrived in five hours and 53 minutes, and Charron reached the same point in six hours and ten minutes, slowing up to show his rear axle, which had been bent in crossing a gutter three kilometers away, but nevertheless determined to persevere.

Rene de Knyff turned up in six hours and forty-nine minutes at a walking pace. His fourth speed having been broken shortly after leaving Chartres, he withdrew.

Three minutes later Jenatzy came up with several punctures and two broken fuses, but still determined to go on.

On leaving Orleans Girardot broke a rear wheel against the curbstone in trying to avoid a frightened horse. The damage was hastily repaired at a neighboring blacksmith shop and Girardot resumed the race at five minutes to eight o'clock, thus losing more than an hour.

Mr. Winton reached Orleans at half-past eight o'clock. One of his front wheels was buckled and his rear left tire punctured. It was not expected that he would continue.

Levegh had passed Orleans at a tremendous gait at twenty-five minutes after five o'clock.

Reports from Gien, 236 kilometers (146.5 miles) timed:

Charron at quarter past seven.

Jenatzy, twenty-eight minutes past eight.

Girardot, a quarter of nine.

At twenty-five minutes past eleven o'clock Rene de Knyff abandoned the race at this point and returned to Paris,

with M. Krebs and Comte de Chasseloup-Laubat.

Nevers, 322 kilometers (200 miles) was passed by Charron at eighteen minutes of nine. Girardot came in at ten minutes past ten.

Charron was still leading at Moulins, 376 kilometers (233½ miles), where he arrived at 9:28, going at full speed and running over a dog. He stopped there for supplies.

Girardot arrived at 11:04.

At La Palisse, 427 kilometers (265 miles), Charron passed at 10:09, followed by Girardot at 11:44.

This being market day, there was quite a crowd to watch the race.

At Ronne, 476 kilometers (286½ miles), Charron passed at 11:03.

Girardot reached there at 11:41.

Telegraphing from Lyons, Le Velo's correspondent announces the receipt of a telegram from Mr. Winton, then at Orleans, declaring his intention to withdraw from the race and return to Paris. Mr. Winton's return was, however, postponed till he could get a new tire.

M. Jenatzy, who was traveling at lightning speed at an early stage of the race, burst his front tires at Chevreuse.

The finish of the international automobile race was placed at the Restaurant des Delices de la Demi Lune, which is a hostelry some ten kilometers out of Lyons.

Thither proceeded a perfect swarm of chauffeurs to welcome the victor.

Charron arrived very much exhausted. Another accident to his machine had occurred twelve kilometers (7½ miles) before the finish. This time it was his pump that had been broken by a dog.

Over the festive board Charron told the story of his exploits while the company was discussing the dessert.

At two o'clock Girardot arrived, and the official times at Lyons are as follows:

1. Charron, 9:09:49.
2. Girardot, 10:30:28.

In the evening the Automobile Bicycle Club of Lyons entertained the two successful chauffeurs.

The difficulty which the American automobilist experienced in the contest was that his machine skidded in going round a corner and bumped into an embankment. The effect of this was that although the wheels were left intact, the steering head, made of forged steel, bent to an angle of forty-five degrees, and yet Mr. Winton continued the race.

It was only when one of the tires of his rear wheel collapsed that the American automobilist was forced to abandon the race.

"The machine," said Mr. Shanks, his companion, "developed twenty-three horsepower. It weighed 1,450 pounds. It had too much power and was too light to successfully compete with the high speed French machines.

"But the fact was demonstrated beyond question that the single cylinder motor, our peculiar type, is practical and does not limit the power to the minimum degree, as is the case with other machines which have been constructed with single cylinders."

Charron said:

"Future races of this kind must be made much shorter. It is impossible to race at the high speed attained at the recent contest without risking one's life.

"If this kind of thing continues the result will be that some day there will be for each competing automobile two chauffeurs less in the world.

"Now, the Course du Trefle is much more reasonable in this respect.

"I left my automobile to be brought back to Paris by train. Girardot, however, is returning to Paris on his racing machine.

"My automobile requires some adjustment. You remember that near Orleans I ran over a dog. The animal's body became entangled in the wheels and springs and caused my automobile to bound along in a rather strange fashion. I was going at the rate of ninety kilometers an hour (nearly fifty-six miles).

"Had De Knyff been able to continue, I should have been very much inclined to give up the contest. The springs of my automobile were started, and the pump was carried away by the accident which I have described.

"The speed obtained was perhaps the best that I have ever officially accomplished, the maximum being at a rate

of about 100 kilometers (sixty-two miles) an hour. This was just before entering Lyons, but I am prepared to bet that I can do the distance betyeen Paris and Lyons in about eight hours, providing I take the direct route.

"The road was, taking it as a whole, not bad, but after leaving La Palisse it was impossible to make more than forty-eight kilometers (thirty miles) an hour. This was due to the sharp turnings and gradients.

"The race proves that the Panhard & Levassor machines must be pretty solid to stand the wear and tear of such a speed on such a road.

"The race also shows that the higher the speed the more frequent the accidents, and hence the fewer to arrive at the winning post."

In regard to Levegh's trip, Charron remarked that it was an easy matter to race when not entered officially, since failure to win did not entail criticism.

As to Jenatzy's performance, Charron was rather sarcastic. So far as the machine was concerned, it was not a machine selected at a late hour, as was reported, but one originally intended for the race.

Charron values the automobile in which he won at 75,000 francs ($15,000).

THE B. G. S.

The French Electric Vehicle Which Recently Made the Record Run of 262 Kilometers on One Charge of the Batteries, at the Customs Depot on the Belgian Frontier.

TO AND FROM EDITOR AND READER

WANTS MANY-SEATED VEHICLE

Editor The Motor Age:—

Will you give me the address of some manufacturer who makes gasolene carriages that will seat from ten to twelve persons?—J. E. Ellis, First, 110 Pleasant Street, Claremont, N. H.

—

The Hasbrouck Motor Co., of 66 Broad Street, New York City, is the only company which, so far as the editor knows, has yet turned its attention to this class of vehicles. It has.—Ed.

WANTS TRICYCLE FRAMES

Editor The Motor Age:—

Can you tell me whether there is a company furnishing tricycle frames for motor tricycles? I have noticed, in your journal, several advertisements of frame builders furnishing complete running gears for four wheelers, but, up to the present time, I have not noticed the announcement of any tricycle frame builders. I believe there will be a demand for the parts which go to the make-up of motor-tricycles, but there seems to be but little interest taken in the tricycle or quadricycle branch of the horseless carriage industry, up to the present time, in this country.—W. N. Whitely, Jr., care Whitely Machine Co., Springfield, Ohio.

—

There is no company in this country furnishing the frames for tricycles or quadricycles. The Waltham Mfg. Co. of Waltham, Mass., manufacture the complete tricycles and quadricycles, and the Canda Mfg. Co. of Cartaret, N. J., complete quadricycles. The parts might be secured from one of these companies, although it is doubtful. In England, the Eadie Mfg. Co. of Redditch, make a specialty of furnishing tricycle and quadricycle parts, including frames fitted with differential gears, with or without wheels and tires. It is true that the tricycle and quadricycle branch of the horseless vehicle industry has received comparatively little attention up to the present time. It does not follow, however, that this will always be so. Indeed, the situation is sure to alter. In France, the home of the automobile, the proportion of motocycles to all other horseless vehicles is more than five to two—more than seventy per cent of the total.

Anyone who has experienced the delights of motocycle riding, its independence and exhilaration, and who considers the lower price of the motocycle,

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NOTE—To make clear the functions of this department of the Motor Age which has become a fixture, under the above caption, the editor begs to state that all subscribers of the paper are at full liberty to take advantage of it to ask any and all questions pertinent to the scope of the paper, which questions he will answer to the best of his ability, either in print or by personal letter—the former when the questions are of such a character that they or their answers may prove interesting to the general reader, and the latter when such is not the case.

Communications of a character generally interesting are also welcome.

Correspondents are requested, however, to make their communications as short and to the point as possible. It is not necessary for them to eulogize the Motor Age or to flatter the editor in order to secure answers to questions or the publication of interesting letters. The well known modesty of the editor would prohibit the publication of such parts of the letters, in any event.

To receive attention correspondents must sign their names and addresses, which, however, will be omitted from published letters, if the correspondent so requests. It is the editor's desire, however, to make this a department in which readers of the Motor Age will feel glad to come before the motor-vehicle public without concealment.

The editor will be grateful for the correction of any mistakes that may creep in, as well as for suggestions from readers, whether pertinent to this department or other portions of the paper.—Ed.

will appreciate the fact that there is ample reason for this proportion. It is merely a question of time and education of the public, before the motocycle will assume widespread popularity and the motocycle industry huge proportions in America. Those firms who appreciate these facts and gain a secure footing in the business in the early days will be the ones to benefit by it.—Ed.

ASKS A CORRECTION

Editor The Motor Age:—

On page 414 of your issue of June 7, you say that the Sherer-Crooks team won the five-mile motor race at Waltham, Mass., using an Aster motor. This is not so. Crooks and Sherer used a De Dion motor and defeated the nearest competitor, who had an Aster, by half a mile, and it might have been a mile, if they had so desired.—Paris Automobile Store.

GASOLENE VEHICLES FOR COMMERCIAL WORK

Editor The Motor Age:—

Will you give me the names of several reliable manufacturers of gasolene motor-vehicles? I am planning to have some gasolene automobiles built for commercial purposes.—J. S. Calfee, care Citizens' Bank of Windsor, Windsor, Mo.

—

It is hard to give advice as to makers who are in a position to turn out the vehicles to the best advantage without more explicit information as to the work they must do.—Ed.

THE MOTOR-VEHICLE FOR HEAVY DUTY

The following is an abstract of a paper read at the Cincinnati meeting (May, 1900) of the American Society of Mechanical Engineers, by Arthur Herschmann, of New York, the mechanical engineer of the Adams Express Co., who have experimented considerably with motor express wagons:

It can be easily proven that the progress of civilization made by all nations has been closely interwoven with the progress of transportation. In olden days men were well satisfied to live, grow, and end their days wherever destiny planted them. There they established themselves, contented with the pursuits of life which were within easy reach, looking to Nature for their maintenance, and buying and trading with their immediate neighbors, and within narrow bounds. It would be outside the scope of this paper to discuss whether life was then less comfortable than it is today, and whether the few commodities then obtainable were insufficient to make existence enjoyable.

At the present day our needs are considerable, varied, and ever increasing. It is no exaggeration to state that many a person's happiness is marred for a good many hours if an express package containing personal goods coming from a great distance should not arrive on the hour.

We all know how an improvement in the facilities for rapid passenger transit shifts the centers of districts where people congregate to manufacture, and the districts where they gather to live. Towns prosper or decay according to transportation facilities, and the value of real estate is seriously affected by them.

The manufacturer and the farmer know what it means to buy and sell where the opportunity is greatest, and how important the item of a quick, safe, and economical transportation of their goods has become at the present day, when the fluctuations in the value of raw material have become an ever increasing factor in the cost of the finished product.

Before the advent of the railroad over-

land transportation was limited to the public highways. Washington maintained that the future prosperity of the country would depend on more horses and national roads, and it can be well said that his prediction has been fulfilled if we only substitute for the word "horse" the words "motive power." When, long after Washington's days, the locomotive appeared, the prevailing idea was that there would be little further use for horses and that all traffic would soon be handled by steam roads. It was different. The fact became apparent that traffic begets traffic, and that the increased opportunity which the railroad presented stimulated local enterprise and necessitated the employment of more horses and wagons to ply to and from railroad stations. It can be safely stated that the amount of merchandise hauled by horses on our streets and over short distances is as great in the aggregate as that carried by the railroads over long distances.

The advent of the bicycle and of the electric trolley car characterized similar periods of apprehension on similar lines, and yet statistics show that the number of horses in use has so far been little affected. However, it bids fair that with the advent of the motor carriage this increase may now be checked, to give way gradually to a diminution in the number of horses used. Some enthusiasts have already predicted that it will be only a few years before there will be no horses on the streets. This sanguinism is not justified. However, while the horse will continue to remain man's best friend among the brute creatures as a saddle horse, and will probably never be wholly substituted in the propulsion of fancy carriages, there can be little doubt that the motor freight vehicle has come to stay and will eventually supersede the horse as a beast of burden. It will evidently be a question of some time and evolution before it will become a universal institution and of the greatest importance to transportation interests.

The motor wagon presents a problem which should admit of no prejudice. It is a case free from sentiment, and merely influenced by economic considerations. The elements constituting in principle a successful motor-vehicle were known and experimented with by enterprising engineers some eighty years ago. The reasons why those experiments did not lead to results are not far to seek. It was then the time of railroad development, and the new competition from the railroad did not encourage costly experiments in a competitive line. Furthermore, the machinery used in the motor carriages was in a crude and undeveloped state. The revival of the movement, which may be said to have begun not more than ten years ago, has met with a great deal of indifference and prejudice. It has been contended that these wagons would frighten the horses, while we can say today that most horses soon become accustomed to the peculiarities of their new competitor. Most of this opposition has come from prejudiced quarters; many of the opinions have been volunteered by persons who had never ridden in a motor carriage, and whose remarks were intended for consumption by the home circle. The advantages of any kind of self-propelled vehicles are patent to any one who stops to give the matter unbiased thought. One has only to think how quickly a motor wagon with its reduced length can thread its way through crowded thoroughfares, and how it thus saves road space which is at present occupied and made dangerous by the oftentimes erratic horse.

The smell caused by the worst of the present day vehicles is not as bad as the smell emanating from horses with which we have to put up in hot weather.

It may be contended that the heavier weights supported by the largest types of motor wagons will damage the roads, but this can be proven to be a fallacy since even if such damage did occur it would be more than outbalanced by the pounding and tearing action of the horses' hoofs.

One of the necessities for the successful running of motor-vehicles, for some time to come, will be a good road surface, and those responsible for the maintenance of public roads could well afford to encourage the new movement, seeing that by the use of motor wagons a considerable saving will be effected in the

matter of street cleaning, let alone the improvements in the hygienic condition of the roads.

The matter of safety has often been doubted, and, while we will consider it later when studying the characteristics of different systems of motor wagons, it may here be said that statistics have already shown the new vehicle to be far safer from accidents than the horse drawn vehicle.

At times the horse will stop of its own sweet will, and refuse to budge, but, in case of emergency, using his best efforts he could seldom pull up from full speed inside of less than thirty yards. It necessarily takes time to communicate the driver's will to the horses' brain, and from there to the horses' muscles. A motor wagon, on the other hand, can be quickly stopped, as powerful brakes are within easy reach of the driver, whose intelligence alone is challenged in case of emergency. In addition, the driver of the motor wagon will have a clear view of the road ahead without being perched high in the air. It is very difficult to avoid an accident with a horse-driven wagon should the pole chain break, and it is naturally most likely to break when it is most wanted, i. e., when suddenly pulling up.

There is another important item which is strongly in favor of the motor wagon as compared with the use of horses. Horses are dependent on the weather. Flies molest them in summer time, and the driver is often led to believe they are sick or tired, and will naturally slacken up for fear of straining them. Climbing a steep hill he will often get off the wagon to save his horses, and it is evident that all this interferes with economical transportation.

We have briefly touched upon the matter of brakes, and this really is the nucleus of the speed question. We need only consider the speed of modern railway trains and ask ourselves whether such a speed could be safely maintained without the use of air brakes to approach the speed question of motor wagons. It is an easy matter to provide for powerful brakes on a motor wagon, and the propelling motor lends itself in many cases as a very powerful second brake. We have found that a load of three tons on a motor wagon, running at a speed of eight miles, could be pulled up in eight yards, a performance which could never be obtained with horses. It may have escaped the notice of the onlooker that when we speak of an eight-mile gait with horses it should be asked, how long can they keep it up, and then it should be considered that it would probably only approximate a five-mile gait of a motor wagon, which latter never gets tired, runs evenly, and is ready to do work as long as we provide fuel, and, further, is satisfied to remain where we leave it when put out of commission. The latter consideration is an economic advantage not to be overlooked in the operation of motor wagons.

Taking up the different propelling agencies which have been experimented with so far, we find that almost every known motive power has been tried. Steam was employed as early as 1820, and such wagons were built by the world-renowned Ericsson and Tangyes in England, and even James Watt is said to have constructed a steam carriage. With the low steam pressures then available, poor roads, and difficulties with unreliable material and workmanship, it is not surprising that the matter was allowed to drop. The next experiments were in the line of oil engines, followed by electric vehicles, compressed air, carbonic acid and the revived steam carriage.

Naturally, in this country, leading the world in electrical subjects, expectations were greatest with electric vehicles. The electric equipment renders a vehicle clean and easy to operate. These vehicles can be made to answer the requirements of running on smooth city roads. The suitable commutation of battery cells provided in these vehicles, effected, through interconnection of contacts on the "controller" affords, together with the series and multiple arrangement of the motor, some flexibility in the power and speed conditions of the machine. There are, however, inherent disadvantages to the use of batteries, which grow prohibitive in a motor wagon intended to

carry heavy weights over a long distance. It is common experience that on rough roads the punishment is more than the batteries can stand, and where we have a case of heavy loads to be carried, necessitating the use of steel tires, we can well say that at this phase of the evolution the battery makes the electric truck an impossibility. It would lead too far to enter minutely into the matter of cost of operating electric wagons, but it may be stated that the best traction cell has only a capacity of about seven watts per pound of its weight, and with this as a basis, one can soon calculate how much dead weight a wagon would have to carry to propel a big load over a long distance with one charge. The "maintenance" of batteries, apart from the actual cost of charging, is seldom spoken of, though it is perhaps the most serious item.

Next to the electric wagon we saw the auto-truck, or, better still, heard about it. It was stated that compressed air trucks would soon be operated in considerable numbers. Now, while it cannot be denied that compressed air would make an ideal motive power, we have still to look for a complete revolution in the construction of light storage tanks to render this power available for trucks, granting that other disadvantages inherent to the use of compressed air can be practically overcome. Weight for weight, stored electricity lends itself more readily to the propulsion of wagons, since it will, as it were, "keep pressure" until it becomes well nigh exhausted, while the air pressure falls gradually as the air is drawn from the storage tanks. The tank weight per cubic foot of air is about eighty-five pounds; the air itself weighs eleven pounds, and at 2,000 pounds per square inch represents 0.27 horsepower hours. To heat the air, considerable weight has to be carried.

Carbonic acid has also been proposed for the operation of wagons, but it suffers in common with compressed air, and, moreover, the raw material to be compressed is by no means cheap.

It has been proposed to compress illuminating gas, and use it for the propulsion of gas motor-wagons. While the radius of the operating district for such a vehicle would be evidently greater than with the other storage systems, seeing that about eighteen cubic feet of gas at normal pressure would already give one brake horsepower, whilst about as many cubic feet of air of 200 pounds pressure, or of carbonic acid of a high pressure are required. This system has, however, the disadvantage of seriously complicating the mechanism.

A great deal of experience has been gained with oil-motor wagons, though chiefly in the line of light pleasure vehicles; and France, in which country there are many thousands of these vehicles plying, has led the world in their exploitation.

As regards freight vehicles, however, no important results have been obtained with the use of explosive motors. A motor wagon, on account of its great weight and peculiarity of operation, must have an abundant supply of power; so great, in fact, as to puzzle the uninitiated observer. We find that a load which can be easily negotiated by one horse, calls for a power equipment equal to about fourteen horsepower on the part of a motor wagon. While we commonly understand that one horsepower equals 33,000 foot pounds per minute, we should consider how great the work of a horse can be for a short while on the race track, or when he becomes infuriated, and, with "blind staggers," dashes into destruction. A horse, when required to pull a heavy load out of a difficult position, will not only jerk and lift the shaft so as to bring the wheels out of a rut and get them on a level, but will momentarily exert power which has been, by means of a dynamometer, shown to be adequate to a performance of what we commonly call fourteen horsepower. Some people, in fact, assert that a horse can for an instant by far exceed the latter figure, but we may be well contented to accept this as a basis of calculation for the supply of motive power. The same horse having pulled his wagon out of the difficult position is able to modify the output of his energy, propelling the wagon at a good rate of speed as soon as he reaches better ground. The "speed-

changing device," which should as nearly as possible emulate the peculiarity of the horse's muscular system, is still the greatest problem with designers of oil wagons. The most ingenious devices have been already tried with a view of filling this gap, and with more or less success; they consist chiefly of such elements as spur and bevel gears, belts, chains, shifting wheels, expanding pulleys or combinations of some of the above devices with brakes and clutches. Even hydraulic and electric combinations have been unsuccessfully tried. An oil engine to run a motor wagon cannot well be designed to vary in speed, at least not in a wide range, and be satisfactory in other respects. Its construction necessitates its running at a constant speed, whilst the speed requirements of the wagon wheels, to which it is geared up, are ever changing. Clutch and shifting gear wheels are, therefore, essential parts of every oil-motor wagon, and their operation, on account of the impact of the moving masses, often gives rise to serious trouble. Non-reversible, an oil engine is by no means a flexible motor. It will not start under load, and when it is in running condition it is very dependent on an even influx of its explosive mixture, and is liable to come to a dead stop without warning when its capacity has been suddenly overtaxed. Anybody who may have gotten stuck with a motor-vehicle while ascending an incline will appreciate these remarks. In such a case it will occur to him that it is very difficult at the same time to release the brake and start the wagon "ahead" on slow speed. It need hardly be said that an oil vehicle is dependent on the weather, inasmuch as the action of the carburator is influenced by the atmosphere. This latter idea leads to the subject of perfect or imperfect combustion and its attendant outward sign, which is an evil-smelling exhaust. The good behavior of large oil engines on heavy trucks after an extended period of running has not yet been satisfactorily proven, and the deterioration due to the pounding on the frame is a serious drawback. The general use and handling of large quantities of gasoline at this stage of evolution of the oil engine is by no means free from risk of explosion, and there is some danger of affecting perishable goods and foodstuffs by the odor, which would naturally permeate them, particularly while standing at the express company's depot.

Having thus described the difficulties with which the electric and oil wagons have to contend, we may devote ourselves to the steam wagon, with which, undoubtedly, important results have already been obtained. Before entering into the technical details of the steam wagon, it would be well to consider the problem from an economic and managerial point of view, since it seems that with the best constructed motor wagon, propelled by any power, the technical aspects are still subservient to the commercial. We have found the steam wagon superior to its competitors for the following reasons:

1. It has the greatest load and mileage capacity, or, in other words, radius of action.

2. Its operation is independent of charging stations, and supplies, necessary for the operation of the wagon, can be easily procured and taken aboard quickly.

The operating expenses in the case of an electric (or, in fact, of any power storage system) vehicle, grow to be prohibitive as soon as a certain ton mileage capacity is exceeded, tending to keep such an electric wagon small in size.

In the case of an oil wagon such economic restrictions to the size do not exist, and the objections to an oil wagon of large capacity are more by virtue of difficulties in operation.

With steam the case is altogether different. The tendency is here, to build a large wagon, since with a steam wagon the weight of the machinery to be carried does not grow even in an arithmetical ratio to the carrying capacity. One advantage found in the operation of a large steam wagon may not be apparent to the casual observer. In the case of the horse-drawn wagon one has to discriminate in loading it with goods which are to be delivered only on the exact route covered by the wagon, seeing

that the daily carrying capacity of a horse is limited, while in the case of a large steam wagon this would be less important, since, as will be shown later, the percentage of operating expense due to actual cost of propulsion proper is infinitely smaller than in the case of traction with animal power.

When I submitted my first report to the Adams Express Co., to whom I stand in the relation of mechanical engineer, in 1898, on the progress made on motor wagons, it was my opinion that there had been, up to that date, nothing constructed likely to form a suitable substitute for a horse-drawn wagon but a steam propelled vehicle. President L. C. Weir then remarked, that there seemed to be less difficulty in constructing such a wagon to do the work of two horses than to construct a successful substitute for a one horse wagon, and I believe that the data, which I intend to give later on, will convince you of the correctness of this opinion.

As regards the construction of steam propelled wagons we find that in spite of the fact that steam equipment has been known for many generations and wagon building has been going on for thousands of years, comparative success has only been obtained within the last few years. Messrs. Scotte, Serpollet and De Dion in France, were the first to revive the movement, but in the last few years more progress was made in England in which country the best steam wagons, so far, have been produced. Easy riding wagons have been constructed for many years, and boilers, steam connections, and engines do not give much trouble on rock bottom foundations, but when we attempt to locate engine and boiler on a wagon which latter they have to drive without suffering from the shock of the locomotion on rough roads, new complications arise which are infinitely more important and troublesome than most people believe who have devoted themselves to the study of this subject. We find early attempts to effect this compromise in a steam vehicle built by the Ericssons in England in 1830, who placed a vertical engine on the rear of their vehicle, and coupled it up with a long, springy connecting rod to the front wheels, which acted as drivers, thereby preventing excessive shock being transmitted from the wheels to the engine.

Wheels in themselves are far more important problems than is generally believed. My opinion is, that at the present day no form of rubber tire will give satisfaction on a commercial wagon intended to carry a net load of, say, one ton or more. The rubber tire is not only expensive, but gives poor satisfaction under the combined action of great weight and speed. Attempts have been made to retain the desirable features of a rubber tire, protecting the latter with a tire shield of steel, dating back as far as the early 70's, but it would seem that such combinations are just as troublesome to maintain. Steel tires, if properly applied to stiff wooden wheels, have been proven to stand most severe work, and they afford the advantage of strengthening the wheels very considerably. It is my opinion, that well constructed springs of ample proportions, are, alone, the means to lessen the shock to which a wagon wheel is subjected. In the case of dished or cored wheels, which I consider to be best adapted for heavy work, a steel tire is indispensable, since it binds the wheel together and prevents the spokes from being torn out when striking an outer obstruction. There is considerable divergence of opinion as to whether a comparatively narrow tire or a wide tire should be used, whether the wheels should be small or large, and whether the front or hind wheels should be driven or steered. While it is a fact, even in the case of motor-propelled vehicles, that the width of the tires should be smaller on hard roads and greater on soft roads (but not on sandy roads or in snow), I think that in the case of steam wagons the total width of the tires in inches should be at least twice the number of gross tons carried when small wagons are concerned, say of a capacity of two tons of net load; this coefficient of two, to decrease in the case of very heavy wagons to one, and even under.

The reasons why small driving wheels

seem to be exclusively used on motor wagons are mostly that it is difficult to design large wheels which will stand such severe strains as motor-wagon wheels are subjected to. In this case the spokes of the wheel not only support the load, as in a horse-drawn vehicle, but they are more or less affected by the action of the driving power, and, moreover, there is also a tendency to twist them. With the ideal wagon wheel the power should be applied directly where the wheel touches the ground. In reality we drive onto a spur wheel, or chain wheel, concentric with the wheel, but of course of a smaller diameter, and such an arrangement makes it desirable that the wheel should also be small. Another reason making small wheels desirable lies in the requirements of the wagon, and the working of a high-speed motor. In other respects it seems to me that a large driving wheel, say of four-foot diameter, will answer much better than a three-foot wheel, such as has been almost exclusively applied to steam wagons. I consider that not only will a four-foot allow of a more powerful starting torque, but it will also save the driving gear, seeing that it does not sink in as deep as a small wheel when it passes over a depression in the road.

The argument presented by advocates of the "front driving" system is, that the wagon will steer a straighter course when the wheel strikes an obstruction, for the reason that the front wheels, in striking, tend to run over the obstruction, instead of being forced aside. I have seen such wagons steered behind and in front, and my opinion is, that any advantage of front driving is more than outbalanced by the disadvantages introduced in connection with awkward location of the machinery. One of the early steam wagons was driven by all four wheels, and if such driving could be practically effected, I think it would prove an excellent feature of a wagon. There are, roughly speaking, two steering systems used—steering with a fifth wheel, and, secondly, steering with pivoted axle ends. It would seem that the fifth wheel steering arrangement is more adapted for heavy work, having the wagon axle unbroken. In reality, this system cannot be as satisfactorily applied as steering with pivoted axle ends. To effect the steering of heavy wagons, spur gearing of suitable purchase has to be used, or a worm and worm wheel device. The latter seems to answer in one of the best designed wagons, but I do not consider it as desirable as steering by means of spur gearing, since it locks the gear, and besides, causes a severer strain on the wagon in case the front wheels strike an obstruction. In rounding a curve, the inner wheels necessarily describe a smaller circle than the outer wheels. To make this practicable the steering device has to be correctly designed, and the two driving wheels have either to be driven by independent motors, or have to be linked together by means of a compensating gear, or, as it is often called "Jack-in-the-box." It will be found that in a heavy wagon, particularly one using dished wheels, this driving and the arrangement of the compensating gear are rather troublesome, and that there is still great scope for improvement in this connection. The transmission gear, forming the link between the rear wheels and the engine, which is almost invariably in front of the driving wheels, I think can only be reliably effected by means of accurate spur wheels, immersed in an oil bath. With a steam wagon it is not necessary to use any kind of a clutch while running, seeing that the steam engine is a very flexible prime mover. Nevertheless, I think that a speed reduction gear, which can be best provided by means of two sets of spur wheels of varying diameter, one set stationary, the other movable axially on a square shaft, forms a desirable adjunct to the mechanism, to be shifted when the wagon is at rest, so as to increase its traction power, and enable it to negotiate any special hill, or extricate the wagon from a bad position. We cannot deny that for many years to come, greasy and hilly roads, or deep snow, will be the greatest difficulties to contend with. I attempted on a damp day, to take a load of four tons up an incline of about one to twenty, covered with Belgian blocks, and there was

trouble with the drivers racing. The engine was geared one to fourteen, and the wheels were of three-foot diameter; in my opinion large and heavier driving wheels and a much lower gear would have taken the wagon up. With the slightest turn of the valve, the engine, without difficulty, started and on account of the poor adhesion and the light machinery ran away before the inertia of the heavy wagon was overcome.

The next question we have to consider is the boiler and engine, machinery with which you are all thoroughly familiar. Among the steam wagons built so far, one can notice a great variety of boiler designs. The desiderata of a suitable boiler for a motor wagon are that it should be of the greatest safety, of small proportion, quick steaming and economic. In addition, it should be of the simplest possible construction, and free from joints likely to work loose by jarring on the road. Pipe boilers, while perhaps a little safer than shell boilers, carrying little water, are, for the same reason, undesirable for the varying demands made of a wagon boiler. There are other objections to small caliber pipes; they are necessarily exposed to intense heat and liable to burn, and without a large dry tank they will make wet steam. A shell boiler, on the other hand, can be made of ample proportions, and, if well constructed, and watched during its use, should give no apprehensions as to its safety. The water level can be more evenly maintained, and this is a point of some importance. I consider a superheating device an all-round advantage, provided it is correctly applied to the boiler.

In addition to the engine feed pump, there should always be a second steam driven pump instead of an injector, which latter when of small proportions has not yet been made to give satisfaction on a wagon.

The firing of a wagon boiler can be most easily effected by means of an oil burner, and with a steam governed burner the firing will automatically respond to the requirements. However, in addition to the inherent disadvantages of using oil, it is difficult to maintain the burner in good trim during all kinds of weather, and at this stage of perfection oil burners will "roar" and occasionally give trouble and make smoke. For the latter reasons coal and coke are preferable, being besides cheaper in use. Solid fuel can be conveniently stowed away, around the boiler, which latter is generally fixed in front of the wagon, and, if thus located, the stored fuel acts as a compressible safeguard to the boiler in case of a heavy collision. In using a shell boiler it is found convenient to fire through the boiler top, a system originally introduced into steam-wagon practice with the DeDion boiler.

The difficulties with which one has to contend in the use of steam wagons are, that they will occasionally show a little steam ,and during a sharp frost it will be found difficult to prevent a pipe from being frozen up. "Blowing-off" will be found annoying, but this nuisance is largely caused by neglect of the driver and suppressible.

However, these are difficulties which will be overcome in time; using a condenser there will be practically no visible exhaust in all weathers.

Condensers, however, are by no means desirable constituents of a motor wagon, and I should rather put up with an occasional cloud of steam than with a permanent shower bath due to leaky pipes and the difficulties in running a condenser. It can be well said that difficulties in connection with smoke have already been overcome.

The engine so far used is in almost every case a compound. If of vertical design it can be located under the driver's seat; while if of horizontal type it can be suspended from the body. In all cases a light and well designed, quick revolution engine will answer the purpose if it is fitted with a reversing gear, and means to admit high pressure steam to the low pressure cylinder. The cylinder ratio should be larger than with stationary practice, seeing that the pressure used is higher, and that a large, low pressure cylinder means a powerful starting moment under live steam, and especial care has to be taken to connect the engine to the frame in an efficient

manner. A fly-wheel is sometimes fitted, and then used as a brake wheel, but I deem it unnecessary. As regards the size of the engine I refer to tables appended.

Generally it can be observed that most of the wagons constructed are by far too light to stand the severe strain of their work. As can be seen from special tables relating to the running of a steam wagon, their cost of actual propulsion per gross ton is by no means as important an item as, for instance, in an electric vehicle, and one can, therefore, well afford to provide amply for a durable construction. A heavy wagon is just as easy to bring to a standstill as a light wagon, in fact, easier, since it may be fitted with quicker acting brakes, which, on account of their severe action, could not be fitted to a light construction.

The idea seems to prevail among some builders of steam wagons abroad that the driver should also effect repairs of the machinery, and that he should adjust the latter to suit himself. I rather think that this theory is against the economical exploitation of such wagons, more particularly if they are used in numbers.

In the latter case a concern would probably house a number of wagons in a shed at a distance from their center of work which would be too great to stable horses there. Such a shed would have facilities for firing up, taking aboard of hot water and fuel, dropping grates, cleaning, and maintaining, which operations could go on partly from below and without necessarily interfering with the handling of merchandise.

There would be a foreman capable of adjusting the machinery, or of replacing defective parts, and the driver would merely have to be competent to operate the controlling organs and to take care of his boiler. Radical improvements in the storage of electricity or of compressed gases or relating to explosive engines may yet put the steam wagon in the background; but judging from the accomplished facts it is so far the most successful wagon for the economical transportation of heavy loads.

I believe that if the motor wagon is given an unobstructed field and "fair play," it will hold its own and oust the horse-drawn truck in short order. The change must come, and with, perhaps, the exception of the harness-maker everybody will benefit by it. The main trouble seems that educated engineers have so far had little encouragement given them to develop the motor wagon, and that the confused efforts of amateurs and stock-jobbers have drawn the attention of almost everybody to their work, except that of the transportation community, who had no accurate data before them to judge of the practicability of the motor wagon.

Opinions will, however, soon be decided and converge on certain lines, and this once being the case many a designer will be saved from exerting himself in a wrong direction.

NEWS OF THE MOTOR INDUSTRY

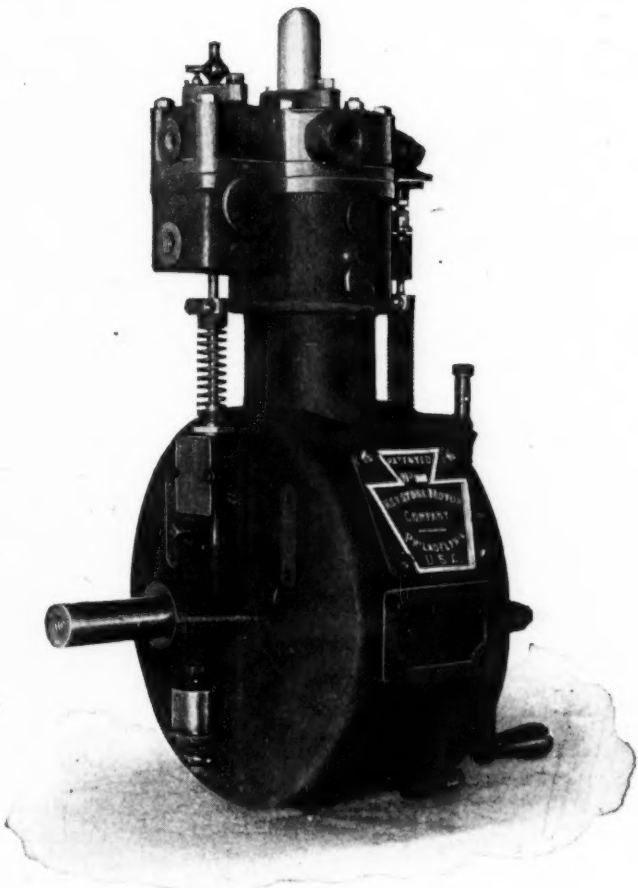
THE KEYSTONE GASOLENE MOTOR

The Keystone gasoline motors for vehicles and launches, which is being marketed by Peter A. Frasee & Co. of 94 Fulton Street, New York City, are built in two sizes, i. e., two and five horsepower. The two-horsepower engine has a cylinder four inches in diameter by 4-inch stroke, and will develop a little more than two brake horsepower at 400 revolutions per minute. The second size has a cylinder five by six inches and will give five brake horsepower at 400 revolutions.

The Keystone motors are of the four-

cycle, enclosed crank case type, the cylinders and cylinder heads being liberally water jacketed.

The enclosed crank case is enclosed and all working parts run in oil and are free from dust and other disturbing elements. The crank case engine is also designed so that the parts are inaccessible.



THE KEYSTONE MOTOR.

The cylinder is accurately bored and treated before the piston is fitted. The piston is carefully fitted to the cylinder. The rings are of a new design and absolutely tight under pressure. The connecting rod is of the marine type, both ends adjustable for wear; the bearings are extra heavy. The material used is the finest phosphor bronze. The crank shaft is a solid steel forging, accurately turned and fitted to the main bearings. The main bearings are of phosphor bronze, very long, and scraped to a bearing. Access to the crank case can be had through two large hand holes, so that adjustments for wear may be readily made.

A special feature is the accessibility of the valves and electric igniter. Either of the valves may be quickly removed, adjusted and replaced without disturbing any other part of the engine or changing any adjustment. This feature is of the greatest possible importance, as the valves must be right, in order that the engine may do good work, and they should be removed and inspected

frequently. This is a very important feature, for, if it were necessary to tear down the engine to inspect the valves, they would, as a rule, go without attention until they became broken or gave trouble. This ready access to all the vital parts is one of the strongest claims for the Keystone motor. The electric igniter may also be removed for adjustment and quickly replaced.

Another important point is the arrangement of piping, alone found on the Keystone motor. The exhaust pipe, admission pipe, or water pipes may be carried to the engine from either side, rendering it less difficult to connect up under all conditions.

Pads for bolting the engine in place are provided. They are on either side of the crank case and are planed, drilled and tapped.

All Keystone engines are numbered. They are subjected to a ten consecutive hour test which consists of determining the indicated or theoretical horsepower, the brake or real horsepower, and the fuel consumption under various loads, and unless an engine passes this standard in every particular it is not shipped. A complete record of these tests is kept by the makers on file, and may be inspected by purchasers at any time.

A system for the duplication of parts has been established which makes it possible to order parts with the certainty that they will fit.

With each Keystone engine is fur- a muffler, carbonetter, spark coil and a set of batteries.

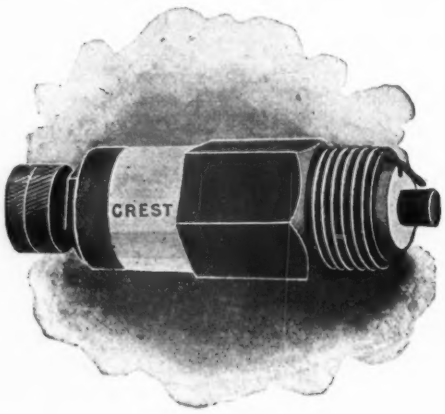
The Keystone Motor Co. guarantees their motors to be in good running order when they leave the factory, to have developed their full rated break horsepower and in every way to be up to their standard. They further guarantee the engine for one year against imperfect workmanship and material, and will replace free of charge any defective part that may be returned to them.

NEW CREST SPARKING PLUG

The Crest Mfg. Co. of Cambridgeport, Mass., manufacturers, of Crest motors for automobiles, are putting on the market a radically new design of sparking plug that is not affected by heat and expansion and is claimed to be unbreakable.

After considerable expense in experimenting with the best porcelain of foreign manufacture, they have, through the assistance of a well known chemist, discovered a new material that is unbreakable by heat or expansion. They have had these sparking plugs in use for a long time on their motors without any reports of failures, and have decided to introduce them to other manufacturers and users of other makes of motors.

It is well known that the sparking plug is a delicate piece of mechanism and gives considerable trouble, and the failure of motors can frequently be traced to the failure of the sparking plugs, and for this reason all automobilists often carry one or two spare sparking plugs in their kit.



Crest Sparking Plug.

Although the jump spark method is the most largely used to-day on account of the simplicity, it would be universally used in preference to the contact and wipe spark methods if it were not for the troubles of the sparking plug and its liability to crack with the intense heat of the motor, short circuiting the secondary circuit.

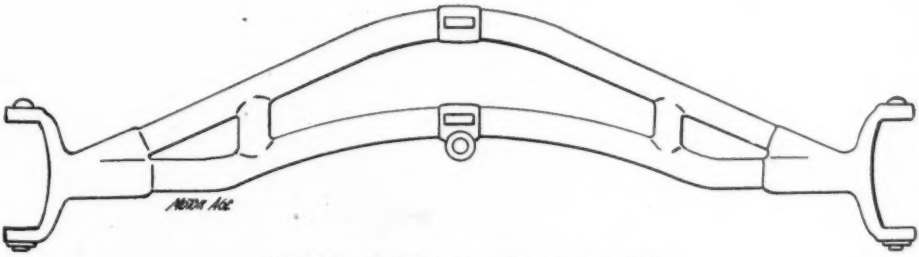
The material used in this plug is a perfect electrical non-conductor, and does not expand under intense heat. It

is a tough material, not being brittle like porcelain.

The sparking plug, as shown in the cut, consists of a shell of steel having a thread at one end to screw in the orifice of the chamber of the motor.

The sparking plug proper consists of a slight cone of this new material, which is inserted in the steel plug. This cone fits tight in the shell, making a gas-tight joint, without packing, unlike all other forms of sparking plugs. Packed joints, in the hands of unskilled persons, are apt to cause failure in the working of the motor. Through this cone a wire is passed, terminating at the bottom of the plug with an enlarged head. A platinum wire is inserted in the body of the steel shell, the spark jumping across between the two points.

The plugs are sold singly or in lots of twenty-five to 100 to the trade. Directions go with each plug.



AUTOCAR COMPANY'S STEERING AXLE.

STEERING AXLE DESIGN

Design No. 32,822, to William Morgan, Pittsburg, Pa., and James G. Haeslet, Allegheny, Pa., assignors to the Autocar Co. of Pittsburg, Pa.

This is the only thing from the patent office, in relation to motor-vehicles, which is worthy of showing this week. The construction is shown clearly by the illustration. The Autocar Co., now located at Ardmore, Pa., has entered the automobile industry on a large scale.

A VALUABLE ADDITION

The staff of the Diamond Rubber Co. of Akron, Ohio has recently been reinforced by the addition of W. Montague Perrett, who has been connected with the tire business for more than a decade past, during which time he has made many close friends and an almost unlimited number of acquaintances in the trade. For more than seven years he was connected with the American Dunlop Tire Co. and when he left he carried with him such commendations from the firm as is seldom the lot of any representative to merit, as well as the warm friendship of his former associates. He will act as general representative for his new firm and will devote a large portion of his time to the growing vehicle tire business of the company. His headquarters will be at the factory at Akron. Both Mr. Perrett and the company are to be congratulated on the connection which is bound to result advantageously for both.

AUSTRALIAN NOTES

Sydney, N. S. W., May 8.—It is rumored that Bennett & Wood, Ltd., the largest N. S. W. cycle importers, intend to enter the motor-vehicle trade, and that they have secured the agency for New South Wales of the Thompson steam phaeton, which is built in Victoria.

An interesting trial is to be made within the course of a few days with the Thompson motor-car, which has been on exhibition at the Sydney Agricultural show during the Easter holidays. The Thompson car, the production of a Melbourne engineer, is propelled by steam, and is built as a phaeton, fitted with Dunlop pneumatic carriage tires, the whole forming a compact and handsome turnout. It is the intention of the builder and designer to attempt an overland trip with his car

from Sydney to Melbourne, 604 miles, a route that is hilly and rough enough to test the strength and endurance of a bullock wagon, let alone a light phaeton.

C. A. Proctor, the energetic secretary of the Dunlop Tire Co. of Australasia, left Melbourne yesterday, accompanied by his wife, for a business trip to London in connection with the company he represents. Mr. Proctor's trip will be a flying one, but it portends important additions to the business of the present company, which will more than likely take the initiative in introducing up-to-date motor-cars and voiturettes into all the Australian colonies.

Kelburn Edge, the managing director of the Melbourne Austral Cycle Agency, is evincing great interest in the motor-car industry in Victoria. He is one of the principals of the Thompson Motor Car Co. Edge seems to be a bit of a "Jonah," as anything he touches in the cycle trade never seems to prosper. It is to be hoped that his connection with the Thompson Motor Car Co. will not cause that concern to lose money, instead of making it.

AT THE PARIS EXPOSITION

Reports from the Paris Exposition indicate a vast deal of interest in the au-

Automobile Section at the Paris Exposition.

tomobile section, which, however, is not so large as was expected. As a matter of course the French vehicles predominate. Unbiased critics declare, though, that the few American machines shown, display more careful workmanship and better finish than any others. The greatest amount of attention is attracted by the racing machines. The accompanying illustration of the section is reproduced from the Revue Technique, of Paris.

G & J VEHICLE TIRE

The accompanying illustration shows a photographic reprodution, made di-

G & J Vehicle Tire.

rectly from the original, of a section of the G. & J. vehicle tire, made by the G. & J. Tire Co. of Indianapolis. The tire, as will be seen by reference to the illustration, is of the double tube variety, and, in case of puncture, can be readily repaired by removing the outer casing and putting a patch on the separate inner tube. This is a desirable feature in tires of the thickness necessary for motor-vehicles, in which it is a particularly difficult task to repair the occasionally inevitable pnctures. Tires made on this principle are almost exclusively used abroad. The G. & J. company are catering largely to the vehicle trade and are making tires especially for automobiles.

CHANGE IN VARLEY COMPANY

The Varley Duplex Magnet Co., located at No. 137 Seventh Street, Jersey City, a corporation organized in 1893, under the laws of the state of New Jersey, has been dissolved by the unani-

mous consent of all the stockholders. A new company, with name Varley Duplex Magnet Co., was incorporated last week under New Jersey laws, with a capital stock of $3,000,000, divided as follows: $500,000 six per cent cumulative preferred, $2,500,000 common. The names of the officers, directors and subscribers to all of the new stock are precisely the same as of the old company, now dissolved.

The new company will take in a wider range of work, the principal object being to manufacture electro magnets both of the ordinary style and duplex or bare wire windings. The company will draw its own wire, and the plant in Jersey City will be increased to about ten times its present capacity. The parent company will operate a number of factories that will be engaged in the manufacture of magnets, including seven foreign factories, and all of the manufacturing facilities, such as automatic magnet winding machinery, wire drawing machinery, wire covering machinery, etc., will be designed and constructed at the works of the parent company in Jersey City.

The names of the officers, directors and subscribing stockholders are as follows: Richard Varley, president; John Scott, vice-president; Robert D. Miller, treasurer; William J. Varley, secretary, and John S. Brown.

On Friday last, at Dover, Del., the Altha Automobile & Power Co. was incorporated with a capital of $500,000. Its object, as stated in the articles of incorporation, is "to deal in automobiles and other kinds of vehicles."

MOTOR RACING AND MOTOR PACING

RACE ENDED IN ARREST

Boston, June 17.—An automobile race was held this morning in Newton and after two and one-half miles had been ridden, the policemen who had been concealed in some trees down the road stopped the race by arresting Albert Champion, the French middle distance cycle rider and Charles Boyden of Harvard College. Champion was on a tricycle and Boyden in a steam locomobile. C. H. Metz, president of the Waltham Mfg. Co., the first to start, was not caught, as the officers were sleeping when he passed. The other two contestants, John Robbins on a tricycle and Gren, another Harvard man, in a steam vehicle, got a tip and stopped in time to escape arrest. The chief of police, who had supposedly tipped the autofans off that they might run the race between five and six, was at the start arrayed in citizens' clothes and friendly with them all. His minions were two and one-half miles down the boulevard, the route of the race being from Newton to Norumbega Park and return, 12½ miles. When Boyden came along a minute back of Metz, he was stopped and arrested. Champion had to stop or kill one of the officers. Handcuffs were placed on him and he was led away a prisoner to the station. In court later on and after breakfast, which Champion had at a neighboring hotel, he gave the judge a statement about being a stranger and not up to the laws of the land. The judge allowed him to go on the payment of a fine of $5 and the incident was closed. Boyden also paid $5. In summing up the judge said that he would like to see a speedway for the automobile men over which they would be allowed to test the speed of their machines and the chaffeurs present to the number of a score said "Amen."

BOSTWICK A PLUCKY RACER

Paris, June 7.—The event of the past week in racing circles was the two-day Bordeaux-Perigeueux-Bordeaux road

event on June 3 and 4. The first day the racers sped from Bordeaux to Perigeueux over a course 116 kilometers in length, and on the second day made the return trip over a course 202 kilometers long. The racers were divided into no less than seven classes, according to the style and horsepower of the vehicles, and some of these classes were even divided into sub-classes, according to the number of passengers carried.

The chief interest, however, centered in the largest and most powerful vehicles. There were an even fifty starters in all classes. In the big class the order of the finish was the same for the first four, on both days. The following is the order, with the times for the two days and the total time:

	Time		
Order Finish.	1st day.	2d day.	Total.
1. Levegh	1:24:35	2:40:10	4:09:45
.2 Giraud	1:27:11	2:45:25	4:12:36
3. Bostwick . . .	1:31:43	2:48:23	4:20:06
4. Farman . . .	1:42:05	3:02:02	4:44:07

Albert C. Bostwick, the American, attracted a great deal of attention, both on account of his being a member of the Automobile Club of America, and on account of his plucky conduct and excellent control of his machine, which is the one he recently purchased from Rene de Knyff, on which the latter won the Pau and Nice-Marseilles contests. He drove the machine himself, although he had Fournier as mechanicien, or assistant. The sentiment expressed by Le Velo, that, "although he has nothing of the physical make-up of De Knyff, still he handled his machine in a manner to stamp him as one of the future kings of the road," is generally acknowledged to be correct.

The winning of the contest for both days by Thery, in the voiturette class, is also noticeable.

The speed of the racers on the first day was astounding, Levegh, the winner, covering the whole course at an average speed of more than 82½ kilometers (fifty-one miles) an hour.

MOTOR MEN NEED INSTRUCTION

W. D. Gash of the Waltham Mfg. Co. says that motor men should take a course of instruction in caring for their machines. They know nothing about them and when a machine goes wrong the maker is censured. Many a motor is shipped back to the factory to be attended to which needs nothing but some minor adjustment. One machine was shipped to the factory from Cincinnati, at an expense of $27 for the round trip, and one hour's attention was all that was required. This attention might have been given to it by any fairly well posted motor man.

MOTOR RECORDS BROKEN

New York, June 17.—Walter W. Smith, Jr., a fifteen-year-old Brooklyn boy, made new world's amateur records for the half and the mile behind motor pace at Berkeley Oval June 15. His figures were: quarter, :23 3-5; half, :45; three-quarters, 1:06 1-5; mile 1:28. The same afternoon his pacemakers, Judge and Miller, rode their motor tandem a mile as follows: quarter, :20 2-5; half, :41 1-5; three-quarters, 1:01 1-5; mile, 1:21 4-5.

On the Vailsburgh, N. J., quarter-mile board track on June 16, Jimmy Michael beat the New Jersey state records for two, three and five miles with the Sherrer-Crooks motor tandem to pace. His miles were ridden as follows: one mile, 1:48; two miles, 3:36; three miles, 5:24; four miles, 7:11 4-5; five miles, 8:51 2-5.

At Manhattan Beach track on June 15th Charley Miller, of Chicago, rode five miles in practice in 8:16 behind motor pace.

FROM THE FOUR WINDS

REQUIRE LICENCES IN YONKERS

New York, June 17.—The boiler inspectors of Yonkers, near this city, have served notice on the police that hereafter every operator of a steam vehicle in that city not supplied with a Yonkers license must be arrested. This is directed against all automobilists whose machines are operated by steam. The order was served on Chief of Police McLaughlin last night.

The inspectors declare that it is a serious menace to life and limb to permit persons who are not familiar with the handling of boilers to operate steam autos in that city. The question at once arose whether the police should arrest a person who is licensed in some other city.

The inspectors insisted that they should, and gave as their reason the fact that there is no state law governing the license question, and that every operator and owner of a steam vehicle is amenable to the ordinances and regulations in every city in the state.

The new rule does not relate to any other kind of automobile save those operated by steam. Chief McLaughlin does not anticipate any trouble with the Yonkers owners of machines, but expects to have considerable trouble with out of town owners, of whom a large number visit Yonkers every Sunday.

He says, however, that he will comply with the orders of the inspectors and arrest every man in Yonkers operating a machine without a Yonkers license and let the courts decide on the merits of the case.

THEY NEVER KICK

A country paper is responsible for the following:

We ain't kicking, of course, but we do feel that we were born too soon, when we think of the advantages the young men have who do their courting in an automobile—no lines to bother and nothing to do but keep the dear sweet things at their sides from falling out.

Backward, turn backward, O Time in your flight,
And give us a chance again, just for one night;
Make us to realize, Time, if you can,
That we are a boy, again, and—not a man.
Remove those grey locks, erase wrinkles, now deep,
While we, in the auto, lull angels to sleep.

PHILADELPHIA CLUB CHARTER

Philadelphia, June 18.—In Court of Common Pleas No. 4, Thursday last, application was made for a charter for the Automobile Club of Philadelphia. The purposes of the proposed corporation, as stated in the application, are "to maintain a club house and to provide other requisites for the comfort and convenience in the pursuit of automobiling, together with the advancement of automobiling interests generally by force of example of the use of automobiles and similar machines as practicable and enjoyable aids to locomotion."

The directors, seven in number, are each of them required to be "the owner of a self-propelled pleasure vehicle or vehicles for personal or private use." The directors and incorporators are: G. Jason Waters, Robert E. Glendinning, W. W. Gibbs, John L. Wilson, Henry G. Morris, Herbert Lloyd and Frank C. Lewin.

MEETING OF THE MOTO CLUB DE FRANCE

Paris, June 8.—The first meeting of the committee of the new Moto Club de France was held in the offices of Le Velo on the 6th instant. The meet lasted two hours and during that time 155 new members were accepted, making more than 200 members already. It was decided that no membership fee would be taken for the present year and that those who had already sent in such would be credited with it for 1901. Ladies will

be admitted when presented by two members. The club will make no difference in recognizing professionals or amateurs and all those who take interest in the new locomotion will be accepted as members if otherwise desirable. Each member agrees to bring into the club as many new members as possible. A legal committee was appointed composed of Attorneys Du Laurens de la Barre and Delauney. Any member whose case appears just will be defended free by the lawyers of the club. The club decided to promote a monster tour of France in May, 1901, similar to the 1,000-mile trial recently completed in England and Scotland under the auspices of the Automobile Club of Great Britain.

VANDERBILT'S AUTOS IN NEWPORT

The agitation against automobiles in Newport, R. I., is not as serious as some reports would make it appear, although some fifty local residents did petition the city council that an ordinance be passed for the regulation of their speed and the licensing of all persons using them, says the New York Sun. No action was taken in the matter and it will be a month at least before anything can be done. It was reported that Prof. Alexander Agassiz had complained to the police about William K. Vanderbilt, Jr., speeding his French automobile on the Ocean Drive. The police deny that such a complaint was made and have no record of any plaint.

The agitation against the automobile is attributed largely to hackmen and livery stable keepers who see a falling off in their business since the automobile has become so popular with society folk, and by requiring a license they think that many would abandon the automobile craze.

MISCELLANEOUS

Advertisements under this head 5 cents per word, cash with order. Express orders, post office orders, or postage stamps accepted.

FOR SALE

AUTOMOBILE FOR SALE, $500.00 CASH. Orient Quadricycle, with extra wheel for tricycle. In perfect condition, brand new. Want to purchase large gasolene to seat four. Can make immediate delivery. Address B. G., care Motor Age.

FOR SALE—An invention of great value to motor vehicle and bicycle frame manufacturers. Effects large saving in expense, increases strength and improves appearance. Patents applied for. Address in first instance, FRAME, care Motor Age, Monon Building, Chicago.

FOR SALE.

"Winner" Gasoline Runabout, made by Elgin Automobile Co. Original price, $700. First offer above $350 gets it. OSCAR S. LEAR,
Columbus, Ohio.

WANTED

WANTED, to purchase, second-hand gasolene vehicle, in good condition, to carry two persons. State make and price to P. O. Box 349, St. Charles, Ill.

STEAM RUNABOUT

Seamless Steel Boiler, - - tested to 1000 lbs. Cold Water Pressure.
Seamless Air and Gasoline Tanks, " 500 " " "

Patent Pilot Light, continuing working steam indefinitely. ✱ Independent Pump for Boiler low water. ✱ Gasoline capacity for 75 miles. ✱ Electric light for water glass.

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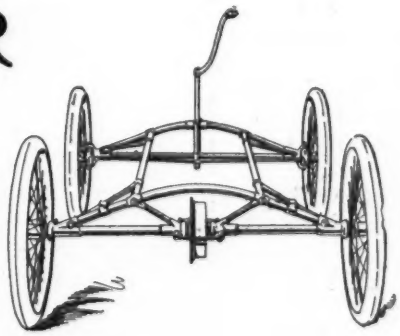

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We guarantee our material and workmanship.

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